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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Subin George

Serial No. 10/086,167

Filed: February 28, 2002

For: **SYSTEM AND METHOD FOR  
INHIBITING READS TO  
NON-GUARANTEED DATA IN  
REMAPPED PORTIONS OF A  
STORAGE MEDIUM**

§ Group Art Unit: 2114  
§  
§ Examiner: Contino, Paul F.  
§  
§ Atty. Dkt. No.: 5681-09700  
§ P6869

CERTIFICATE OF MAILING 37 C.F.R. § 1.8	
I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below:	
	<u>Robert C. Kowert</u> Name of Registered Representative
<u>June 28, 2005</u> Date	<u>[Signature]</u> Signature

**APPEAL BRIEF**

**Mail Stop Appeal Brief - Patents**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir/Madam:

Further to the Notice of Appeal filed April 28, 2005, Appellant presents this Appeal Brief. Appellant respectfully requests that this appeal be considered by the Board of Patent Appeals and Interferences.

## **I. REAL PARTY IN INTEREST**

As evidenced by the assignment recorded at Reel 012682, Frame 0233, the subject application is owned by Sun Microsystems, Inc., a corporation organized and existing under and by virtue of the laws of the State of Delaware, and now having its principal place of business at 4150 Network Circle, Santa Clara, CA 95054.

## **II. RELATED APPEALS AND INTERFERENCES**

No other appeals, interferences or judicial proceedings are known which would be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

## **III. STATUS OF CLAIMS**

Claims 1-29 are pending. Claims 1-11 and 29 are allowed. Claims 15, 16 and 25-28 are objected to as depending from a rejected base claim but otherwise allowable if rewritten in independent form. Claims 12-14 and 17-24 are rejected. The rejection of claims 12-14 and 17-24 is being appealed. A copy of claims 12-14 and 17-24 is included in the Claims Appendix hereto.

## **IV. STATUS OF AMENDMENTS**

No amendments to the claims have been submitted subsequent to the final rejection.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

Storage devices, such as magnetic or optical disk drives, are often organized into addressable portions such as tracks and sectors. Often, a mapping is provided between the logical organization of addressable portions of a storage device, as seen by, e.g., operating system software, and the physical organization of those portions as managed by

the device itself. *See, e.g.,* specification, p. 1, lines 10-30. Some portions of a storage device may be detected as defective during the device manufacturing process or initial deployment of the device. Such portions may be identified as defective, and logical portions corresponding to defective portions may be remapped to other areas of the storage device. For example, a storage device or an associated software device driver may maintain one or more data structures that identify defective device sectors. *See, e.g.,* specification, p. 2, line 1 – p.3, line 3. It is also possible that a portion of a storage device may become defective during device operation, for example after data has already been stored to that portion. As in the case of defects detected during manufacturing or initial deployment, a logical portion corresponding to a device portion that are detected to be defective during device operation may be mapped to a new device portion. Additionally, the data stored by the defective device portion may be copied to the new portion. However, the data stored by the defective portion may be corrupt (e.g., owing to the defect) and thus the copied data may not be guaranteed to be correct. *See, e.g.,* specification, p. 3, lines 5-8. Corrupted data may cause incorrect operation of software or hardware that depends on that data.

Independent claim 12 is directed to a storage device that includes a controller configured to receive a command to access data stored by a storage medium at a first address and to responsively control an access mechanism to access the addressed portion of the storage medium. The controller is configured to inhibit read access to the addressed portion if the address is listed on a non-read list, and is also configured to remove the address from the non-read list in response to a successful write to the addressed portion. One embodiment of such a storage device is illustrated in Fig. 8, which shows a hard drive 700 including magnetic disks 715 configured as a storage medium, as well as arms 721 and head assemblies 729 configured to access sectors of disks 715 for reading and writing, as described in the specification at p. 18, lines 1-26. As shown in Fig. 8, hard drive 700 also includes controller 719. In one embodiment, as shown in Fig. 9 and described in the specification at p. 18, line 28 – p. 19, line 25, controller 719 is configured to manage a non-read list 751 stored within storage medium

715. Controller 719 may operate to inhibit read accesses of sectors of storage medium 715 if addresses of those sectors are indicated on non-read list 751, as illustrated in Fig. 2 and described in the specification at p. 10, lines 16-25. Controller 719 may also operate to remove addresses from non-read list 751 in response to successful writes to such addresses, as illustrated in Fig. 3 and described in the specification at p. 10, lines 27 – p. 11, line 10.

Independent claim 18 is directed to a data processing system having certain limitations similar to those of the storage device of claim 12. The system includes a storage array coupled to a host computer system and including a plurality of storage devices, of which a first storage device has a non-read list managed by a controller. An application program executed by the host computer system generates a read command to read from a portion of the first storage device. The controller is configured to inhibit performance of the read command if an address of the portion is listed on the non-read list, and to remove the address of the portion from the non-read list in response to a successful write to the portion. One embodiment of such a data processing system is illustrated in Fig. 4, in which a storage system 150 is coupled to a host system 101 via connection 132 and includes an array controller 154 coupled to a storage device array 158 including a number of storage devices 160a-e, as described in the specification at p. 11, line 12 – p. 12, line 21. In one embodiment, host system 101 may be configured to manage the non-read list, for example via device driver software, as described in the specification at p. 12, line 23 – p. 13, line 19. In other embodiments, management of the non-read list may be performed internally to storage system 150, e.g., by individual storage devices 160 as described above with respect to claim 12.

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

1. Claims 12-14 and 17-24 are rejected under 35 U.S.C. § 102(e) as being anticipated by Schibilla (U.S. Patent 6,384,999) (hereinafter, “Schibilla”).

## VII. ARGUMENT

### First Ground of Rejection:

Claims 12-14 and 17-24 are finally rejected under 35 U.S.C. § 102(e) as being anticipated by Schibilla. Appellant traverses this rejection for the following reasons.

**Schibilla does not teach a controller that is configured to inhibit read access to a first portion of the storage medium if the first portion's address is listed on a non-read list, wherein the controller is configured to remove the first portion's address from the non-read list in response to a successful write to the first portion.** Schibilla is directed to a method in which marginally defective data sites of a storage device are recovered. Schibilla specifically states at col. 6, lines 39-54:

During operation of disk drive 30, data sites 78 containing user data are read from disk surface 52. In some instances, the disk read operation encounters difficulty when reading a particular data site 78. As an example, multiple retries may be required in order to successfully read data from the data site.... Marginally defective data sites are defined as data sites that are still operational, but which frequently encounter recoverable errors during normal operation of the disk drive.

Thus, a marginally defective data site according to Schibilla is not in fact permanently defective, in that it is "still operational," but is experiencing errors at a rate in excess of a data site that is not marginally defective.

Once a data site has been identified as marginally defective, Schibilla discloses that an attempt to rewrite the data stored at the site is made (col. 7, lines 36-47 and Fig. 3). If the rewrite attempt is successful, the data site is no longer considered to be marginally defective. If the rewrite attempt does not succeed, however, the data site is "reclassified as a defective data site" (col. 7, lines 54-56) and placed in a non-read list of defective data sites (block 97 of Fig. 3, GLIST 144 of Fig. 5). Schibilla also uses the terminology "soft error" to refer to transient, recoverable errors, such as recoverable marginally defective data sites, and "hard error" to refer to permanent errors, such as marginally defective data sites that fail to be recovered (col. 1, lines 57-67).

Appellant notes that in order for a data site to be identified as marginally defective, read access must be allowed to the data site, as Schibilla specifically defines the marginally defective state as a function of read access performance. That is, reads to a marginally defective data site of Schibilla are not, and in fact cannot be inhibited: in order to perform the rewrite operation that is the basis for determining whether a marginally defective data site is permanently defective, the site must be read. That is, "...when marginally defective data sites have been identified by the present invention, the present invention recovers data from the marginally defective data site [i.e., by reading the data], and writes the recovered data to a spare data site elsewhere in the disk surface..." (col. 6, lines 62-66) As described above and shown in Fig. 3, only when the marginally defective data site of Schibilla is reclassified as a defective data site is the site added to a non-read list.

Thus, a marginally defective data site of Schibilla cannot correspond to the non-read list recited in Appellant's claim 12, in that as recited in claim 12, read access to a first portion of a storage medium is inhibited if the first portion's address is listed on a non-read list. In rejecting claim 12 in the Final Action of January 25, 2005, the Examiner states that Schibilla discloses detecting a marginally defective data site and further determining if the data site is still able to be read from successfully. The Examiner further states that Schibilla thus *implies* that read access to the data site is inhibited during this process, and is "listed" internally to allow for Schibilla's method of data site reliability testing. However, as demonstrated by the above discussion of the operation of Schibilla's method, the Examiner's interpretation of Schibilla is clearly incorrect, and is in fact contradicted by the Examiner's own remarks in the Final Action made in response to Appellant's response to the Office Action of August 17, 2004 (response filed November 16, 2004). In the "Response to Arguments" section of the Final Action, the Examiner agrees with Appellant that Schibilla's marginally defective data sites are read before the data site is listed on a non-read list, and that as "soft errors," marginally defective data sites are not candidates for listing in a non-read list.

The Examiner contends that Schibilla's teaching of "hard errors" for which reads are inhibited corresponds to the non-read list recited in claim 12. However, this is entirely inconsistent with the limitation of claim 12 in which it is recited that an address of a portion of a storage medium is removed from the non-read list in response to a successful write to that portion. As noted above, according to Schibilla, if data cannot be successfully read at all from a data site, then the data site is deemed to have a permanent hard sector error that cannot be recovered (col. 1, lines 57-60; col. 6, lines 55-57). In Schibilla, once a data site has a "hard error", no attempt is ever made to write or read that data site again. The "successful rewriting" operation in Schibilla applies only to marginally defective data sites; however, as previously shown, Schibilla does not inhibit reads for marginally defective data sites. For sites determined by Schibilla to be "hard error" sites, no attempt is ever made to write or read that data site again.

Listing of a data site in the non-read (hard error) list of Schibilla is therefore mutually exclusive with marginally defective status of a data site. That is, disregarding data sites that are operating normally, a given data site of Schibilla is either marginally defective, in which case it is not listed in a non-read list and reads to the site are not inhibited, or it is permanently defective, in which case it is listed in a non-read list and reads to the site are permanently inhibited. Further, listing of a data site in Schibilla's non-read list is permanent and irreversible: Schibilla discloses that any attempt to access a non-read-listed data site is instead mapped to a spare data site (col. 10, lines 29-36 and Fig. 5). Thus, Schibilla stands in direct opposition to the recitations of claim 12, in which it is clearly stated that although read access to a portion of a storage medium is inhibited if the address of that portion is listed on a non-read list, the address of the portion may be removed from the non-read list in response to a successful write to the portion.

Appellant notes that anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. M.P.E.P 2131; *Lindemann Maschinenfabrik GmbH v. American Hoist &*

*Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). The identical invention must be shown in as complete detail as is contained in the claims. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). As set forth above, Schibilla clearly fails to meet this standard, and Appellant therefore submits that claim 12 is not anticipated by Schibilla. Appellant notes that the above arguments also apply to claim 18, which recites limitations directed to a non-read list that are similar to those of claim 12. Appellant therefore submits that claim 18 is also not anticipated by Schibilla.

### VIII. CONCLUSION

For the foregoing reasons, it is submitted that the Examiner's rejection of claims 12-14 and 17-24 was erroneous, and reversal of his decision is respectfully requested.

The Commissioner is authorized to charge the appeal brief fee of \$500.00 and any other fees that may be due to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5681-09700/RCK. This Appeal Brief is submitted with a return receipt postcard.

Respectfully submitted,



Robert C. Kowert  
Reg. No. 39,255  
Attorney for Appellants

Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C.  
P.O. Box 398  
Austin, TX 78767-0398  
(512) 853-8850  
Date: June 28, 2005



## **IX. CLAIMS APPENDIX**

The claims on appeal are as follows.

12. A storage device comprising:

a storage medium comprising a plurality of portions, wherein each portion is identified by an address;

an access mechanism configured to access data stored on the storage medium;

a controller coupled to control the access mechanism, wherein the controller is configured to receive a command to access data at a first address and to responsively control the access mechanism to access a first portion of the storage medium;

wherein the controller is configured to inhibit read access to the first portion if the first portion's address is listed on a non-read list;

wherein the controller is configured to remove the first portion's address from the non-read list in response to a successful write to the first portion.

13. The storage device of claim 12, wherein the non-read list is stored on the storage medium.

14. The storage device of claim 12, wherein the storage device is a hard drive, and wherein the first portion is a first sector of a hard disk platter.

17. The data processing system of claim 12, wherein the controller is configured to generate an error indication in response to inhibiting read access to the first portion.

18. A data processing system comprising:

a host computer system including a memory and a processor;

a storage array coupled to the host computer system, wherein the storage array includes a plurality of storage devices, wherein a first storage device of the plurality of storage devices has a non-read list;

a controller coupled to manage the non-read list;

wherein an application program stored in the memory and executed by the processor is configured to generate a read command to read data from a first portion of a storage medium included in the first storage device;

wherein if an address of the first portion is listed on the non-read list, the controller is configured to inhibit performance of the read command, wherein the controller is configured to remove the address of the first portion from the non-read list in response to a successful write to the first portion.

19. The data processing system of claim 18, wherein the controller is configured to generate an error indication in response to inhibiting performance of the read command.

20. The data processing system of claim 18, wherein the non-read list is stored on the storage medium.

21. The data processing system of claim 18, wherein the controller is included in a storage device controller included in the first storage device.

22. The data processing system of claim 18, wherein the controller is included in an array controller coupled between the host computer system and the storage array.

23. The data processing system of claim 18, wherein the controller is implemented in program instructions stored in the memory and executed by the processor.

24. The data processing system of claim 18, wherein the storage device is a hard drive, and wherein the first portion is a first sector of a hard disk platter.

**X. EVIDENCE APPENDIX**

No evidence submitted under 37 CFR §§ 1.130, 1.131 or 1.132 or otherwise entered by the Examiner is relied upon in this appeal.

**XI. RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.